UNIVERSITY OF WASHINGTON

ARBORETUM BULLETIN

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SPRING, 1972

PRESIDENT'S MESSAGE

Although the Foundation did not get any budgetary increase *per se* in our efforts at contacting the legislators during their interim session, we did receive some sincere expressions of concern and two concrete results:

A Senate resolution to help examine the needs of the Arboretum and propose it as a budget item for the 1973 legislature.

Approximately $56,000 worth of Emergency Employment Act money for maintenance.

The other results of our effort at informing the legislature will be published in the summer Bulletin.

The plans for the plant sale under the chairmanship of Mrs. Arthur P. Gardiner are coming along. The proceeds from the hard work of the last plant sale proved very important in the financial crisis at the Arboretum. This year, upwards of $12,000 was donated by the Unit Council for such things as interim salaries and machine rentals. We are certain that the proceeds from the next plant sale will prove just as necessary — hopefully not for maintenance but for other needs.

Plans for the symposium are being firmed up. The title is to be "The Urban Arboretum in Time of Crisis." Four questions will form the backbone of the symposium:

1. What is an arboretum? A review of functions and purposes in the light of present day experience and reasonably anticipated trends.
2. How and by whom should an arboretum be administered, organized, and preserved to meet the conflicting and dynamic demands of a modern city?
3. What can an arboretum do for the scientific and cultural communities of its region?
4. In what ways may an arboretum serve the recreational needs of an urban area? What is its proper interaction with the general public?

The principal speakers are:

Dr. Roy L. Taylor, Botanical Garden, University of British Columbia, Moderator
Dr. Leslie Laking, Royal Botanical Gardens, Ontario, Canada
Dr. Francis De Vos, Chicago Botanic Garden
Mr. Francis Ching, Los Angeles State and County Arboretum
Dr. Louis Martin, Chicago Horticultural Society

Plans now are to hold the symposium at the Hub on the University of Washington campus June 8, 9, and 10. In addition to non-participating listeners, the audience June 8 and 9 will include state, county, and city officials concerned with the problems of an arboretum, as well as faculty members from the University of Washington and other colleges, and the directors from neighboring arboreta. We plan to conclude with a summarization of the proceedings to be presented for a public meeting on June 10.

We hope the results of this symposium will give all of us further insight into the development and future of our arboretum.

THE ARBORETUM BULLETIN

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THE UNIVERSITY OF WASHINGTON

Arboretum bulletin

VOLUME XXXV, NUMBER 1

Spring, 1972

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COVER PHOTO: *Magnolia sinensis,* University of Washington Arboretum. (See p. 18) Photo by: William Eng

Fruits of *Osmaronia cerasiformis* each one-half inch long, plum purple.
Photo by: B. O. Mulligan

WANTED: A Wild Garden . . .

*MARJORIE W. BAIRD**

Mrs. Chester Paulson, a member of the Seattle Garden Club's horticulture class, heard that her father Mr. D. K. MacDonald wanted to have a wild garden. Since this year's study project was Wild Flowers, the chance to plan and help plant such a garden could not have come at a more propitious time.

With Mr. MacDonald's approval, Mrs. Clarence Bledsoe and her committee went to appraise the situation. The property is situated on a sheltered bay of Lake Washington and the ground slopes eastward to the water. The house is located approximately midway between the eastern and western ends. North of the entrance drive and 125 feet along the west end of the property, about 45 feet wide, a strip of neat, almost-bare ground is densely shaded most of the day with native firs, cedars, pine, a few cultivated trees, and a thicket of Portugal laurel. The sun peeks over the southern tree-screen at midday and filters through the leaves from the west side in mid-afternoon.

Mainly, the problems were three: acquiring more light, providing an adequate growing medium, and making selected residents of the Canadian and Hudsonian zones contented in the Humid Transition zone! Mr. Peterson, the able and amiable caretaker, took time from his many duties to solve the first two with a saw and many loads of leaf-mold mixed with a little sand. We will not know for two or three seasons if we have solved the third. In several places, mounding a hill, topped by a rotting stump, relieved the flatness of the topography and mossy old logs were used as accents. A low, wet area became a gravelly "dry-pond," which will no doubt hold water during the winter.

With Floras open, we mulled over the many plants available in the Pacific Northwest, from

*Mrs. Hugh Baird, a member of the BULLETIN Editorial Board and the Seattle Garden Club, is a frequent contributor to our publication.

the woods or from our gardens and plant sales. Last fall we planted bulbs: four varieties of erythronium, *Fritillaria lanceolata, Trillium ovatum,* and *Lilium columbianum* in the drier areas; *Camassia* (2 species), and *Smilacina racemosa* in the more moist spots. Then came the ground-covers: *Linnaea borealis* (Twinflower), *Cornus canadensis* (Canadian Bunchberry, or Ground Dogwood), *Gaultheria ovatifolia.* Also planted at that time were *Cornus nuttallii* (Pacific Dogwood), *Acer circinatum* (Vine Maple), *Osmaronia cerasiformis* (Indian Plum), *Mahonia aquifolium* (Oregon Grape), *Vaccinium ovatum* (Evergreen Huckleberry), *Rhododendron macrophyllum, Polystichum munitum* (Sword Fern), and *Blechnum spicant* (Deer Fern).

Spring planting included: *Asarum caudatum* (Wild Ginger), *Smilacina stellata* (Starry Solomon's Seal), *Disporum oregonum* (Fairy Bells) in the shadier places; *Ledum groenlandicum* (Labrador tea), *Kalmia polifolia* (Bog Kalmis), and *Viola sempervirens* (Evergreen Violet) in the sunnier damp spots; *Polypodium vulgare* (Licorice Fern), *Polypodium scouleri* (Leatherleaf Polypody), *Rubus lasiococcus* and *R. pedatus* (Trailing and Dwarf Raspberry) on mossy logs; *Arctostaphylos uva-ursi* (Kinnikinnick) in the sunniest, driest area; *Vaccinium parvifolium* (the red deciduous huckleberry) on the largest stump, and elsewhere. *Rhododendron occidentale* (Oregon Azalea), sharing the sun with the Columbia lilies, was underplanted with *Vancouveria planypetala* (an evergreen vancouveria). *Adiantum pedatum* (both the large and dwarf forms of Maidenhair Fern) and *Polystichum andersonii* (Anderson Fern) seemed at home near the "dry-pond," while the *Gymnocarpium dryopteris* (Oak Fern) provided a deciduous ground-cover with *Erythronium oregonum* under a clump of vine maples. *Mitella ovalis* (Mitrewort) and *Coptis laciniata* (Gold Thread) were placed in drifts in dry and moist places respectively.

As these and many other growing plants were put in, they were watered with a transplanting solution to reduce shock and stimulate root growth. In order to ascertain which site was preferred, we placed several of the species in various locations: *Tolmiea menziesii, Asarum caudatum, Dicentra formosa, Iris douglasiana, Erythronium* sps., *Heuchera glabra,* etc.

Mahonia nervosa **in Camellia border in the Arboretum.** Photo by: Don Normark

Though some of our more discriminating species, such as the pyrolas and *Goodyera decipiens* (rattlesnake plantain), may not become acclimated to the not-so-sharp drainage of this soil, they will contribute to an interesting experiment. Following the progress of the garden through several seasons will teach us a great deal about our many beautiful natives and their requirements under cultivation. We have planted a total of 71 species and 3 varieties, representing 21 plant families, and plan to bring in a few more, hopefully, some which are in danger of disappearing.

The following list shows the species, by family, represented. The plants from the Hudsonian and Canadian zones are marked with "H" and "C" respectively. The others live in the Transition or Humid Transition zone.

Polypodiaceae — Fern Family
- *Adiantum pedatum (and dwarf form)*
- *Blechnum spicant — to C.*
- *Dryopteris austriacus — to C.*
- *Gymnocarpium dryopteris — to C.*
- *Polypodium scouleri*
- *P. vulgare — to C.*
- *Polystichum andersonii — C., H*
- *P. munitum — to C.*

Selaginellacea — Selaginella Family
- *Selaginella sp.*

Liliaceae — Lily Family
- *Camassia leichtlinii — blue & white forms*
- *C. quamash*
- *Disporum oregonum*
- *Erythronium californicum*
- *E. citrinum*
- *E. oregonum*
- *E. revolutum "Rose Beauty"*
- *E. revolutum "White Beauty"*
- *Fritillaria lanceolata — to C.*
- *Lilium columbianum — to H.*
- *Maianthemum dilatatum*
- *Smilacina racemosa — C.*
- *S. stellata*
- *Steptopus amplexifolius — to C.*
- *Trillium ovatum*
- *Xerophyllum tenax — to H.*

Iridaceae — Iris Family
- *Iris douglasiana*
- *I. tenax*

Orchidaceae — Orchid Family
- *Goodyeara decipiens*

Aristolochiaceae — Birthwort Family
- *Asarum caudatum — to C.*

Portulacaceae — Purslane Family
- *Claytonia siberica — to C.*

Ranunculaceae — Buttercup Family
- *Aquilegia formosa — to H.*
- *Anemone deltoides*
- *Coptis laciniata — C.*

Berberidaceae — Barberry Family
- *Achlys tripylla*
- *Mahonia aquifolium — to C.*
- *M. nervosa*

(continued on page 26)

Vaccinium ovatum **in Arboretum Woodland Garden. Seedling** *Cornus Nuttallii* **on left.**
Photo by: E. F. Marten

Doing It Right — The First Time

*ROBERTA WIGHTMAN**

Conserving and preserving mean saving. Saving is having. You *have* some property. You are seeking advice — advice about how to conserve the soil, preserve the view, save the trees. You are foresighted, for without wise counsel you may discover too late, heartbreakingly late, that the very features you admire most about your property you will lose. Happily you probably *can* conserve, preserve and save. To do so, however, you must first understand a few basic facts about your property and reasons why certain actions become not only advisable, but in many instances imperative. Secondly you must insist on explicit instructions in your *first* contract — for example, instructions for installation of underground utilities such as water, gas, electricity, telephone, sewer or drain or for preparation of the route for a road or driveway.

Primary to the development of any site is a thorough knowledge of its attributes and faults. If this property of yours is to be built upon at some future time, consider:

THE TOPOGRAPHY: the "contour" of the land and its relationship to adjoining property. Does the uphill neighbor's surface (and subsurface) drainage run into or across your land? Does yours empty onto the downhill neighbor's property? Where will such "storm" water end up eventually? On an average yearly basis, forty-five percent of rainfall penetrates; the balance runs off the surface. As you seal over areas of penetration by paving or building, one hundred percent of precipitation runs off of these sites. Excessive moisture in soil makes it heavier, looser and less resistant to sideways and downward pressures and weights. Two practical and often used means of diverting concentrated run-off are 1) intercepting the flow by ditches, curbs, tile lines and 2) collecting the excess water in tile ditches and at low points on the terrain. Such intercepted and collected storm water must then be disposed of. In neighborhoods having separate sewer line (i.e., sanitary as differentiated from storm) the appropriate connection is made. In some districts it may be permitted to admit storm water into the sanitary sewer lines. In either case protect yourself and your insurance coverage by procuring proper permits and inspections for such connections. If there is *no* storm sewer connection then you have to re-distribute this excess water into the soil in approximately the same fashion as a septic line operates utilizing principles of evaporation and penetration, or you could impound some of this run-off in one or more "holding" ponds or pools and use these as part of your site improvement (landscape development).

THE ORIENTATION. This will bring an awareness of prevailing wind, amount of direct sunlight, view, or other related characteristics.

EXISTING PLANT MATERIAL. Condition, age, type, density, location in relation to building and access routes all may have an important bearing.

OTHER EXISTING FEATURES. A stream bed, pond, swamp, rock outcroppings, fallen logs, picturesque stumps, lake or ocean beach, for example, may help to pre-determine site improvement. Vestiges of former use such as a driveway, a walk, walls, steps, terraces, etc. are also important to consider.

FUTURE USES OF LAND. Consider the soil stability, its quality and depth, for example.

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*Roberta A. Wightman, a graduate of the University of Illinois with a degree in Landscape Architecture, is one of the longest established Landscape Architects in the Seattle area. Long a supporter of the Arboretum and Arboretum-related activities, her comments are based on practical knowledge gained from years of experience in commercial, residential and recreational properties.

Having considered the foregoing, hard and fast rules for procedures cannot be applied to all properties. One rule, however is to be sure the title is clear; another, be sure you know where and have clearly and permanently marked the property lines and corners. Generally, you advised to:

LOCATE FUTURE BUILDING SITE, keeping in mind the approach, the slopes, view, existing trees, prevailing wind, sun and shade. Try to fit the building to the site rather than the site to the building. This can affect the steepness of the driveway, need for retaining walls, loss of desirable existing trees, preservation of view, amount of "usable" land, privacy, need for screens, etc. This may mean a few steps up or down in various rooms of the building, carports, garages or courts.

TRY TO AVOID the need for deep cuts and fills or other abrupt changes in existing terrain.

REMEMBER when "saving" trees that their roots spread as far from the trunk as do their branches; that the feeding roots are at the tips, that they are seldom deeper than eighteen to twenty-four inches; that the anchor roots must be left undisturbed on *all* sides; that a mature or well-established tree has adjusted to certain conditions of soil moisture, direction and velocity of wind, degree of sunlight, proximity to other trees. It can and may adjust gradually to changes in small degree. To safeguard and protect the saved plant material during construction or clearing process, fence off at edge of branch spread. A ribbon tied around a tree trunk is not protection; it is identification! If thinning out of stands of trees is to be done, proceed in stages; that is, remove a few of the less desirable every year so as to accustom the saved trees to more light and more wind and more soil moisture. Consider saving some trees for one or two years for their screening effect and as cover, to be replaced with owner's choice of variety later and gradually.

REMOVE top six to eight inches of soil from sites of roads, car parking, and buildings to predetermined convenient locations. Apply base layer or foundation of crushed rock (not gravel) to road beds and use them during construction. This will keep cars and trucks and piles of material from compacting soil *not* to be used for construction, and will provide a well-compacted base for future paving. Unless it is needed for fill, dispose of excavated subsoil off the site.

DETERMINE LOCATION of utility lines (gas, electricity, telephone, water; television cable, sewer, drains) taking cognizance of tree roots, future paving, etc. Otherwise a utility line ditch may cut through your saved trees and their roots. The "backhoe" will tramp down and mangle underbrush and low branches. *You* decide where it is to go, not the equipment operator. Such connections from service source are usually done in a straight line. Where *you* want it located may be a longer line and will cost a little more, but final results may be more than worth the added cost.

PROVIDE CONDUITS in the form of large diameter pipes for future sprinkler lines, drain lines, outdoor lighting *under* sites of walks, walls, steps, roads *before* construction. Be sure they are big enough. Too small is none at all.

POSTPONE PAVING of large fill areas for at least six months (if topography or building plans have necessitated fill areas). A year is better. All fills, no matter how well mechanically compacted, will continue to settle and stabilize during this time. Surfacing this area with grass or fine crushed rock will make it pleasant to look at and quite usable during the settling process. It will also give you time to "live with" this area. You might then wish to vary your original plan for the space.

LOCATE water faucets for hand watering, car and pavement and deck washing where you need not use more than a fifty foot length of hose to reach the objective.

GET ACQUAINTED with the property, especially if it is to be used for a dwelling, by visiting it at all times of year and times of day, in all kinds of weather. Picnic on it; camp on it. This will help to decide house and drive locations. Take a ladder with you to simulate floor grades and to take best advantage of views. Don't assume that a view-impairing tree on a nearby undeveloped property can be removed "for the asking." The tree may be *that* property owner's favorite tree!

CONSIDER PRESERVATION of groups of trees rather than individuals and areas to be left undisturbed at margins of property for several reasons: soil conservation, erosion control, wind protection, visual and noise screening, less maintenance. Fence off these areas; feed the trees; and water them if clearing and construction process has cut off or curtailed their normal water supply. If using weed or brush killer chemicals for unwanted growth control, keep in mind that trees and shrubs can also be injured and killed by these chemicals in the soil where their roots too are growing. When in doubt, clear by hand. Always use week killers when there is *no* wind. Drifting spray of dust can defoliate. In the clearing of land for a road or a building, if high-branched, top heavy trees must be left exposed to high winds, it is possible to guy them to each other or to a firm base or pole. After several years of acclimatization perhaps the guys may be removed. If they are well-placed they may not "show" and can be left. Examination and adjustments should be made every year or so.

PROVIDE YOURSELF with an accurate and complete detailed topography of the land showing dimensions, corner grades, significant changes in terrain, locations of all trees, their variety, size, condition, grade at base; other existing features, stream course, rocks, stumps (if to be preserved), fallen mossy logs (if this is to be part of your landscape), beds or groups of desirable shrubs and/or groundcover, and access to or proximity of utility services, public roads or streets.

DO NOT DISTURB native plant cover of existing steep banks, even if it is nettles, bracken, wild blackberry, broom, alder, willow, or bigleaf maple. The roots are holding the surface of the bank. Do not add weight to the top of such a bank. Do not add water to the top or surface of the bank. You can gradually introduce desirable plant material to the bank, removing the originals one at a time or a patch at a time. Be sure you use tough, tenacious, deeprooting material that requires no extra watering. If you must add hard surface (to provide vista or outlook or view point) consider a wood deck rather than heavy paving. If you have a lawn on top of this bank, or if roof drains are nearby, intercept and gather this run-off water into tiles, pipes, ditches and direct it *away* from the bank.

AVOID ENTIRELY steep, man-made banks. If not possible, remember that tons and tons of loose rock merely *add* to the problem of slippage, erosion, and collapse. Consider a gradual slope instead of a steep one; this will take up more land. Or consider a series of low retaining walls and terraces or gentle slopes between. It is unwise, indeed, foolhardy, to fail to provide subsurface as well as surface drainage in such a situation. Various earth surface materials have their own "angles of repose". Separate piles of loose sand, gravel, sandy loam, clayey loam, etc. will rest or "repose" at their own "angles", and in the process of settling or slumping to this angle will erode or flatten out. Adding water and weight will hasten this settling and sideways pushing or expansion. So, unless you control this loose or man-made fill and bank, it will, with the help of time and gravity and rainfall, slip downwards and outwards. You can construct retaining walls (not the kind that lean against the bank, although they may give that appearance) on a wide, deep foundation, providing positive, sufficient and accurate drainage behind and through the wall. Re-route and intercept surface water above wall and terraces, so as not to add more weight and "lubrication" to the fill. Wait at least two years before adding more weight to top, such as paving or other heavy construction.

AVOID soil compaction. Though heavy earth moving machinery is a fast worker, it can do (and

does) irreparable harm to soil. Just in the process of rough grading alone these tons and tons of marvelous "beasts" will compact the soil for your shrubs and lawn as they grind relentlessly back and forth, so that you'll spend the rest of your gardening life (or your gardener's life) and much money trying to loosen this material so that roots will grow and water will penetrate. Such heavy mechanical compaction will also change the soil structure and environment for the roots of existing saved trees and may shorten their life span. It will cost more money in man hours and machinery hours to re-grade and spread the base and topsoil with smaller, lighter-weight, perhaps rubber-tired equipment NOW, but you will have many fewer growing and drainage and labor problems (your own, perhaps!) and disappointments from the beginning. Incidentally this will be one of your hardest battles. You may be told you can "perforate" or rotary till the over-compacted soil. This is in no way a remedy, as the perforator or tines penetrate only three or four inches. Ideally you would scarify or rotary till the base material first and then in two or three inch layers add the saved topsoil plus some additional sand and rotary till *this* into the base, continuing the procedure in layers until you reach the finished grade.

ALLOW for disturbed earth to settle when placing topsoil as well as for paving, roads, etc. Twenty percent is a modest amount. If the soil is very loose, with much humus, it will settle even more.

A few basic site planning considerations should be emphasized. If, on sloping property, the building is approached by car and on foot from *above*, be sure the surface, paved or planted, within five or more feet from the wall, slopes away from the wall and foundation.

The gradient or steepness of the approach, up or down, *may well* determine the floor grades. Long flights of steps are seldom used. Switch-back ramps are easier. Driveways need landings top and bottom as places of arrival and departure, or take-off and landing, and there must be correct transition between the slope and the flat. Fourteen percent or a one-foot rise in slightly more than seven foot of run is considered a maximum slope for a driveway. If it is curving and rising then the gradient should be less. Allow sufficient turning and backing space in correct relation to garage or carport, and, if possible, guest car parking. Some cities and towns require enough space be provided for a fire truck to approach and turn around.

If heating of the building is to be provided with oil as fuel, select a place for the tank so that it is filled from trucks and can be replaced without tearing out a shrub bed or a paved area.

If this property is to be used as a residential site, the hobby gardener would do well to select his or her garden and gardening areas in the pre-construction stage. Urban and suburban residential sites are generally screened from each other on two sides and rear. The street side is the "public" side, the rear the private side. Between the screens, whether fences or walls or planting, is some open space and some ornamental planting; here too is the hobby garden and/or the place place. Country properties provide greater choice in use of site due to greater size.

It is not easy to grow grass under large wide-spreading trees. Perhaps the owner should try a groundcover or shade-tolerant shrubs. This might indicate, in the planning stage, where future lawn would start or stop, where one might wrap a shrub bed around the tree, or leave it undisturbed with its own indigenous underplanting. If it *must* be lawn, one-fourth or one-third of the branches of the tree can be thinned out, all the way up and all the way around. Feed the tree to encourage downward or outward tree root activity; topdress the soil as well as enrich it for the grass and plan on extra feedings for grass and tree, "from now on in". A beautifully shaped large tree in a beautifully maintained sweep of lawn is a handsome sight — a pastoral or park-like picture, suited

(continued on page 28)

Dwarf Shrubs and Their Usefulness

*FRANCES KINNE ROBERSON**

Ilex crenata **'Mariesii'; fruiting branch.**
Photo by: Campus Studios

The character of a garden may well be established by trees and tall shrubs but dwarf shrubs create an intimacy between their taller relatives and the ground and between people and the landscape. The breadth of the subject is still astonishing, for it includes variations in stature, in character, and in requirements as to soil, exposure and moisture. Here let us consider some other than conifers, rhododendrons and heathers.

No doubt exists as to the low stature of some spreading shrubs such as *Ceanothus gloriosus* or *C. prostratus.* Their purpose is twofold: first, to furnish handsome year round foliage at ground level; and, second, to prevent soil erosion. These two shrubs are blue to lavender flowered, with the thick, heavily veined leaves of so many ceanothi, and they spread their branches over ever increasing sunny areas as long as good drainage and scant or no watering keep them from damage.

The ground cover shrub known popularly as Bearberry or Kinnikinnick and botanically as *Arctostaphylos uva-ursi* is less exacting in culture and more apt to endure. Its shiny leathery leaves make handsome year round cover, with racemes of small pale pink flowers augmenting this shrub's attractiveness in spring and conspicuous red berries following thereafter. Its creeping stems eventually lose the papery brown bark exposing the orange underlayment. Thicker carpeting or bank covering results from planting *Arctostaphylos media.* The branches are less exposed because the upturned new tips make a dense growth over the stems, the somewhat downy leaves are less shiny than in *A. uva-ursi,* and fruit is scarce, at least for us. Yet this natural hybrid will may be preferred when

*Mrs. L. N. Roberson is presently serving her second consecutive term as President of the Northwest Unit of the American Rock Garden Society. She is a frequent contributor to the American Rock Garden BULLETIN, as well as to the ARBORETUM BULLETIN.

the desired effect is a gradual focus of attention from taller shrubs to ground level.

Two other shrubs which belong in the low spreading category are *Cotoneaster adpressus* and *C. dammeri,* both from China but each quite different from the other in general effect. *C. adpressus* humps itself up to a height of 12 inches over rocks or open soil in an undulating manner. Its tiny dull green leaves achieve reddish brilliance before dropping off in autumn. Flowers of white, sometimes rose-tipped, and bright red berries are also very small. *C. dammeri,* by contrast, runs flatly along the ground or adjusts ever so slightly to root itself among rocks, and has larger flowers, berries and leaves. The berries differ also in color which is coral-red and the leaves are evergreen instead of deciduous. Soil requirements for cotoneasters are not rigid.

Representatives of another genus of plants which supposedly adapt themselves to various soils and which have a spreading habit are *Dryas drummondii* and *D. octopetala.* Both are native to arctic or arctic-alpine regions of North America but *D. octopetala* has long enjoyed great garden popularity because it was early introduced from Europe and is of easy culture and of fairly rapid growth. Its open white flowers may not be as plentiful in cultivation as in the wild but this may result from lack of sun, soil that is too rich, too much water, or some combination of attempted kindnesses. Even when flowerless, *D. octopetala* is attractive as it spreads its self-rooting branches over an ever increasing area so that all may enjoy the display of its gray-backed, oak-like leaves of about an inch in length. But the fluffy seed heads, each composed of numerous plume-tipped seeds, add considerable enjoyment, too. A sea of these heads found in the wild is a never to be forgotten sight. *D. drummondii* accommodates itself to garden cultivation equally well but is less vigorous in response. A yellow flower of nodding habit differentiates this plant from the previous one, as does the shape of the leaf which is usually oblong instead of lanceolate.

Two brooms of dwarf habit and great value for bank protection are *Cytisus kewensis,* a hybrid raised at Kew Gardens, and *Genista sagittalis,* nicknamed Arrow Broom because of the outline of the cross section of the stem. Brooms naturally accept poverty stricken soil and will endure considerable drought. This contrasting pair differ in the following ways. *C. kewensis* has slender, gracefully arching branches on which, in spring, many creamy flowers practically hide the tiny leaflets. The whole plant may be 18 inches or more in height. Pruning after flowering keeps the plant denser. *G. sagittalis* remains flat to the ground, even rooting on occasion, and produces rich golden flowers in profusion on stems of up to 6 inches.

A garden often requires a special plant, or more than one of a kind, of short stature and unusual interest, for a focal point. As we shift our attention to these an uncommon birch comes to mind. *Betula nana* creates a 24 inch mound made up of twiggy branches bearing very small round glossy leaves which turn gold in the fall. Acid soil and considerable moisture are its chief requirements.

A great attraction for a sunny but protected spot is *Daphne collina,* with its heavenly fragrance from clusters of lilac-rose flowers in late spring or early summer. This stiff but rounded shrublet enjoys the same planting conditions which suit other daphnes, with special emphasis on good drainage but a cool root run and on an ample supply of leaf mold in the soil.

Even stiffer in habit and quite angular in outline is one of the Japanese hollies, *Ilex crenata* var. *(Mariesii nummularia).* Its popularity depends more on its habit of growth and on the rich green color of the round leaves than on the inconspicuous yellow-green flowers or black berries.

A procumbent shrub for lime-free soil and some shade is *Leucothoe keiskei,* probably not as easy to locate as *L. catesbaei* or *L. davisiae,* but well worth searching out. Its shiny green leaves contrast sharply with its red stems. The fragrance of the pendant white flowers is a bonus for the successful grower.

Potentilla fruticosa in the wild exhibits marked differences in general habit, and in size and color of flower. So it is not surprising that, by selection and hybridizing, named varieties of this shrub are offered in the trade. One of these, "White Gold," has flowers a good 2 inches in diameter, of soft yellow, and borne in great profusion in summer. Odd branches may

need to be pruned sharply to keep plants from becoming misshapen and straggly. Stems which bend to the ground level often layer themselves and may be cut free to be planted elsewhere. Sun and good drainage are the prime requisites for success.

Two low shrubs with distinctly vertical, rather stiff shoots which create miniature thickets are *Viburnum opulus (Nanum)* and *Spiraea bullata.* The latter has brittle tawny branches hidden in spring by dark green leaves which are puckered as though gathered by needle and thread. The description of the flowers as being of "crushed raspberry color" was what first attracted me to this 10 to 15 inch shrub. The flat corymbs of tiny flowers do indeed cover the top of the plant with just this shade of rose.

Viburnum opulus (Nanum), on the other hand, depends almost entirely for appeal on its more pliable branches which are quite colorful in winter and on its thin, crinkled, dull green leaves in summer. I, for one, have never seen it flower. Its roots and branches may eventually spread to a width of several feet, a habit which enables one to lift rooted portions to establish new plants. It may be 2 or 3 feet high when very old.

A few aromatic herbs of shrubby habit serve a double purpose when used as ornamentals. These plants usually require only poor soil, good drainage, and a protected place in the sun in order to flourish. When an accent of gray color will be useful there are several choices. *Salvia officinalis* (Sage) makes a rounded shrub of 2 to 3 feet in height, is light gray in color, and is often pinched to prevent flowering or pruned as soon as it has finished blooming in order to avoid legginess.

Rosmarinus officinalis (Rosemary), another culinary herb, is much greener than gray although the under sides of the leaves are downy. Again, pruning is essential for shapeliness. Left unpruned it will tend to reach considerable height and to be untidy.

Thymus vulgaris (Thyme) or *T. citriodorus* (Lemon Thyme), respectively green and gray foliaged, are less shrubby and so may best be used as edging shrublets. Fragrance rather than flavor is the chief value of *Lavandula spica* (Lavender) or of any other attractive members of this genus. Some of the dwarf ones such as *L. officinalis* var. *nana* or *L. stoechas* are much coveted but hard to find.

This scant sampling of dwarf shrubs for northwest gardens omits countless more than we have mentioned. But perhaps it will encourage the search for the proper plant for any specific situation so that there will be no lost chords in the garden harmony. ▲

Cotoneaster Dammeri **in fruit, taken in studio.** Photo by: E. F. Marten

THE ROLE OF THE BOTANICAL GARDEN IN THE MODERN WORLD

HOWARD S. IRWIN

Note: The Editorial Board presents this and the following article in edited form (because of space limitations) to stimulate thinking in preparation for the forthcoming symposium. Both articles are from the New York Botanic Garden bimonthly publication the GARDEN JOURNAL, *Vol. 21, No. 6, (December, 1971), and Vol. 22, No. 1, (February, 1972) respectively and are reprinted here with their permission and that of the author, Dr. Howard S. Irwin, Executive Director. The deleted portions pertain to the specific programs of the NYBG and their contributions to the community. A copy of each article in its entirety is available at the Foundation Office.*

Everywhere today there is growing awareness that in our unbalanced relationship with the natural world — signified by rampant starvation, heedless exploitation, appalling pollution, and disappearing species — we are edging closer to the tolerance limits of the delicate, complex fabric of natural law. The growing fight to save our environment will be won not with an occasional Earth Day, but with nothing less than consistent, consecutive, systematic thought and action. It will require all the energy we can muster. It will draw upon the resources of all human institutions.

To survive, man must comprehend the total picture of nature and see himself as a part of the great complex system of intertwining natural forces; he can no longer place himself above or outside this world ecosystem. Central to this, mankind's greatest challenge, is the realization that he must learn to share the resources of this earth by participating, not exploiting; by cycling, not wasting; by appreciating, not destroying.

The battle to save the environment is just beginning, but until the nation decides which sectors of the environment will get priority, and who will pay the price, remedial ecology is nothing but rhetoric. Zoning laws, building codes, air and water pollution regulations are already tolerable restrictions. Population control cannot be very far off. To charge for resource use — every ton of coal, barrel of oil, or gallon of water — would affect the indigent much more than the wealthy. When a plan appears for the equitable distribution of resources, arguments for population control may sound more democratic and persuasive. The problems are enormous, the repercussions seismic, and the outcome uncertain.

Then what, in this period of growing awareness and apprehension, of painful reexamination, of searching for different baselines upon which to build new attitudes, is the most effective role for a botanical garden? More than ever, we assert that those areas enriching the quality of human existence deserve much more attention: cultural activities, intellectual and scientific pursuits, the arts, literature, esthetic improvements, and human relationships. Our particular role is to communicate knowledge and excitement about plants — the biological building blocks upon which all other life depends. We strive for all to become gardeners or botanists or naturalists — if not professional, then amateur. In this mission we do not mean merely to cultivate the random pleasures in the peaceful appreciation of nature, though for some these may be very significant and important experiences. Neither do we mean to suggest that ultimate satisfaction lies in the message that "life is a physiological process with only a physiological meaning," as Joseph Wood Krutch wrote in a moment of personal

desolation. We believe, rather, that knowledge of and confidence in biology as a discipline are essential to the reconciliation man must make with his world.

Biology must be understood in terms of the laws that govern it and the creatures that characterize it. It is our obligation to communicate what we know about the nature and variety of species, of the processes by which speciation occurs, of the forces that direct evolution, of the evidences for continuing evolution of the relations among the species of a habitat. We should not pretend to give definitive, ultimate answers, for in biology authority is antithetic to truth. Yet the extent to which these facets of knowledge can be approximated is exciting and satisfying, as skillful teachers the world over know so well.

Behind all the knowledge lies an underlying theme, that our current command of biology, however imperfect and incomplete, must be turned to minimizing the despoliation of our environment, to conserve our natural resources, and to protect man from the natural consequences of his technology. . .

All men of thought and perception view the human condition with much apprehension today, and agree that the dire predictions of dour Cassandra will come true unless positive action is taken. Thoughtful but not despairing, we believe the answers to these problems are within human capability to discover and implement. We are confident that out of the current social revolution man will redefine his priorities and redirect his energies so that people may lead lives free from the threat of holocaust, hunger, disease, homelessness, and the environmental debasement we have brought upon ourselves.

Degradation of the environment can be stopped only by attack along several fronts. Engineers look for technical solutions. Social scientists need to examine those dysfunctions of man that strain and scar our habitats. Conflicts between an ideal of nature and the current practice of anti-nature are embarrassing to observe, for they have exposed our intellectual failure to make the connection, and perhaps also a degree of hypocrisy. Moreover, they cannot always be resolved. Contradictions are, to a certain degree, inherent in the human condition, as may be seen in even the simplest cultures. Ideals and necessities are frequently opposed, as on the most fundamental level, keeping one's cake and eating it are incompatible.

The extent to which the New York Botanical Garden can more effectively help turn the tide through research, demonstration, teaching, and practice is directly tied to access to suitable environs, where skill and expertise in the management of plant populations, together with participation of those practiced in allied disciplines, can reach fullest expression. The multi-disciplinary approach to research, land management, and resource conservation provides a conceptual framework whose breadth allows all factors to come into play. Natural resource administrators are actually involved in the management of people relating to natural resources. Consequently, a major concern of their role is value determination for present and future generations. The rapidly changing complexities of ecology, technology, science, economics, law, and the population explosion clearly point to the need for multisource identification and analysis of underlying values in the management of natural resources.

However, an undirected multi-disciplinary effort is like a ship without a rudder. A single fundamental discipline provides the base upon which the synthesis of working concepts may grow. Such a manner of operation truly reflects a renaissance of vision and perspective, providing maximum scope and depth. Present specialization and management orientations simply are not getting at essential values for conservation, particularly those concerned with quality and intangibles. The New York Botanical Garden, by its historic concern with research in plants — which are fundamental to all wildlife and human life as well — by its long-term involvement as advisor to foundations, companies, and government at all levels in the management of plant resources, and by its near century of experience as educator of professionals and the public through exhibits, lectures, classes, seminars, consultation, training, and publication, seeks the opportunity to widen its involvement and extend its program into the pressing problems of environmental restoration, control, and management. . .

SHORT HISTORY OF ARBORETUMS

HOWARD S. IRWIN

From the beginnings of recorded history, botanical gardens and systematic tree collections have been important throughout the world in the evolution of modern man. More than 2800 years before Christ, Emperor Shen Ming kept a garden of Chinese medicinal plants. In 1500 B.C., Pharaoh Thotmes III maintained a systematic garden. Aristotle, the great teacher of antiquity, taught and inspired his students in 340 B.C. in the botanical garden he founded at Athens. In the Middle Ages important gardens were started in Italy at Salerno (1309), Pisa (1543), Florence and Padua (1545); and in Germany at Leipzig (1542) and Heidelberg (1593). A tree planted in 1587 with the establishment of the botanical garden at Leiden, Holland, survived until World War II. World-famous today is the arboretum at the Royal Botanic Gardens at Kew, founded in 1759.

The idea of gardens displaying a wide variety of trees hardy in a given region seems to have originated in France. Certainly the first scientific arboretum, consisting of about one thousand species of European and North American trees, was established by du Monceau in the 1700's and led directly to the introduction of many exotic trees to French parks, waysides, and gardens. Vilmorin in 1825 planted the first arboretum of European timber trees, which in time led to Allard's arboretum of oaks.

The first arboretum in the United States was established in Philadelphia by the well-known botanical figure, John Bartram, who sent much American plant material to England for introduction. He planted his arboretum on his own grounds on the banks of the Schuylkill River shortly after 1731. A large ginkgo planted by him is said to be the first of that species grown in the United States.

The first arboretum in the New York area was planted in Flushing in 1793 by Robert Prince and continued there for nearly a century. Its influence on early American forestry and horticulture is perhaps symbolized by the Lombard Poplar, which Prince was the first to introduce to this country. Another early New York arboretum, the Elgin Botanical Garden, was established by Dr. David Hosack, at what is now Rockefeller Center, for the growing of medicinal plants.

Although interest in decorative and useful trees, the natural harmonizers of earth, buildings, and sky, developed slowly in the New World, there are now some 100 arboretums in the United States. Each represents a dedicated effort to instruct and inform by assembling collections of woody plants. Today, with scientific and educational functions paramount, the explicit purposes of a modern arboretum are:

Growing a complete collection of hardy woody plants so that the public may become acquainted with their names and special characteristics.

Testing and introducing species and varieties new to the local area, to widen the botanical diversity, and to enhance the beauty of that area.

Promoting research in ecology, taxonomy, pathology, genetics by providing outdoor facilities and materials for research scientists and for college and high school students.

Providing living collections of woody species for breeding new strains of ornamental and useful plants as well as to develop others showing disease resistance, vigor, and suitability for climate and soils.

Serving as a laboratory adjunct for schools, garden clubs, and conservation groups as a means of inspiring concern and intellectual stimulation and disseminating information about plants, their value to man, and their cultivation.

Conserving native plant life of the area.

Training horticulturists and gardeners.

Demonstrating techniques of plant propagation.

Cooperating with related institutions and agencies for the extension of knowledge.

The range of activities to which an arboretum can aspire depends on the available area and the adequacy of funds, which is directly related to the genuine interest of the general public. In addition, while the public stands to gain immensely from the normal activities of an arboretum, no tract of land can serve all public needs. Some uses and activities are compatible with the main study and training functions, others are not. Those public activities considered compatible with an arboretum program are:

One-day visits by colleges, schools, and community groups.

Self-guided or naturalist-led walks on trails.

Painting, sketching, photographing, writing, and sound recording.

Indoor and outdoor lectures, talks, and exhibits.

Supervised experimentation and observation by college and school groups.

As certain outdoor activities lead to the degradation of natural habitats, especially when repeated at the same site, we must consider them non-compatible with the purposes of an arboretum. Among such non-compatible uses we would include:

Hunting and fishing.

Unsupervised specimen collecting.

Tent and trailer camping and picnicking.

Use of motor vehicles and bicycles except in prescribed areas.

Unrestricted tramping in either wild or planted areas.

Thus an arboretum should not become a public park where people wander at will over the land, but rather must be laid out with adequate footpaths to which visitors are restricted. Trees and shrubs should be clearly labelled with their names native habitats, and other interesting information. Books, pamphlets, and leaflets should be prepared in an attractive format and made available.

Historically arboretums have been founded within the framework of one or another specialization. For example, the Arnold Arboretum in Massachusetts, founded in 1872 and developed under the able direction of Charles Sprague Sargent, was noteworthy for many years as the first American site for the introduction and cultivation of a great range of oriental plants collected by E. H. Wilson. It is rich in the diversity of its collections and tasteful in design although hampered today by its relatively modest scale, some 220 acres. Similarly, the Highland and Durand-Eastman Arboretum of Rochester, New York, while possessing a large collection of woody plants, is confined in extent and program by lack of land. Even more severely restricted are small private arboretums, like the 50-acre Thomas C. Desmond Arboretum near Newburgh, New York. The National Arboretum in Washington, D.C., founded in 1927 with a layout of some 420 acres, is broad in coverage and activity . . .

". . . the forest aisles are lighted by drifts of shining bloom . . . the dogwood, each bloom is like a great white star and each bough is fairly snowed under beneath the gleaming flakes, and each little tree becomes an artful drift of blossoming whiteness."

Donald Culross Peattie,
A Natural History of Western Trees,
Houghton Mifflin, 1953.

1

Cornus Nuttallii...

Reading upper left to right diagonally, Photos 1-3, taken at three week intervals, illustrate the growth of the small flower-scales or bracts partly formed the previous summer and the development of the immature flower. (Photos by: E. F. Marten) Figure 4 shows the button-like clusters of small greenish-yellow flowers in full bloom, surrounded by the white bracts. Figure 5 shows the bright red fruits and the developing bud for next year. (Photos by: William Eng)

Cornus Nuttalii was first observed
unfortunately assumed it to be th
which it differs principally in havi
to six in number. Later Thomas
ornithologist Dr. John K. Townse
Expedition to the Northwest in 18
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Audubon in honor of his friend "
whom the scientific world is deepl
Audubon's BIRDS OF AMERIC
Tailed Pigeon, includes *Cornus Nut*
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having been supplied by Townsen
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2

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3

New or Unusual Plants in the Arboretum

XVII – *Magnolia sinensis* (Rehd. & Wils.) Stapf.

J. A. WITT

The Genus *Magnolia* is an ancient and honorable member of the plant kingdom. It and its relatives were among the first flowering plants to develop back in the distant geologic past, and indeed present species seem to differ but little from those found as fossils from past ages.

The present members of the genus are, of course, among the finest of ornamentals; so much so they have found their way into our literature as symbols of opulence and the good life. We often think of them as stately trees, and perhaps the majority of commonly cultivated species are, but there are some equally handsome large shrubs among them with which to grace our gardens.

Among the shrubby forms there is a group of closely related species native to Asia from the Eastern Himalaya mountains to Japan that includes *MM. globosa, Sieboldii, sinensis* and *Wilsonii.* This group is called the *Oyama* section of the genus, named for the Japanese vernacular name of *Magnolia Sieboldii.* It is characterized by being shrub-like, with deciduous leaves and having cupshaped white flowers with bright red stamens, flowering in late spring and early summer.

Of the four members of the *Oyama* section three are fairly widely distributed geographically except for *Magnolia sinensis* which is known only from a very restricted locality in western China. Dr. Ernest Wilson discovered it growing in the mountains of western Szechuan in 1908. As near as I can determine it has not been re-introduced since that time and was found growing only near the town of Wenchuan (Wenchwan) on the Min river. Wenchuan's latitude is approximately that of northern Florida, but the elevation from which the plant was found, 6,500 to 8,500 feet, indicated that it should be relatively hardy; a fact confirmed in England and here in Seattle where it has never been damaged by cold.

Magnolia sinensis is, as mentioned above, a large shrub. Our plant growing in the Magnolia collection was set out in 1952 and is now a multi-stemmed specimen about eight to nine feet tall and spreading to over fifteen feet wide. It has a grayish brown smooth bark on the older wood with new growth slightly darker. Its leaves begin to develop in late March or early April and are nearly full grown by flowering time. They are bold, dark green above and covered below with a brownish-gray mat of soft hairs that drops away as the leaf matures. The size varies from three to seven inches long and two to six inches broad, usually widest above the middle. The leaf apex is blunt with a small tip or mucro while the base varies from round to broadly cuneate (wedge-shaped).

Its flowers appear in mid May in the Arboretum, just after *Magnolia Wilsonii* and just before *M. Sieboldii*, both of which are growing nearby. They are pure white, cup-shaped at first then opening nearly flat, finally exposing a cluster of bright crimson stamens surrounding the green gynoecium. When fully expanded the flowers are three to four inches across and deliciously fragrant. (See cover photo.).

The flowers are carried on recurved pedicels, a botanist's way of saying they are nodding. This habit of the open flowers facing down makes *Magnolia sinensis* a plant to be looked up to, not down upon. The Arboretum's plant is a truly handsome sight when in full flower in May covered as it is with sparkling white cup-shaped bells all touched with crimson.

There is another period of interest in September when the fruit ripens. These are pendulous, pale pink cones about three inches long composed of a number of carpels that split open revealing shining scarlet seeds.

The Arboretum imported five seedlings of *Magnolia sinensis* from Hillier and Sons Nursery, Winchester, England, in 1947. These were

planted out between 1952 and 1954 but only one is still living. The others failed to survive, not because of any cold damage but largely because of our summer droughts. The plant seems to require moist rich soil to do well, a trait common with most of its relatives. It will stand full sun, in the Seattle area at least, but perhaps should receive some shelter from strong winds lest its large leaves suffer. Propagation is probably best by seed which are produced in quantity most years. There is some danger, however, that the seedlings might be hybrids with some other species. One such hybrid has been described as *Magnolia* X *highdownensis*, a cross between *M. sinensis* and *M. Wilsonii* which occurred in England before 1938.

Magnolia sinensis is available in at least one Pacific Northwest nursery but still is very rare in our gardens despite its obvious merits and beauty. ♠

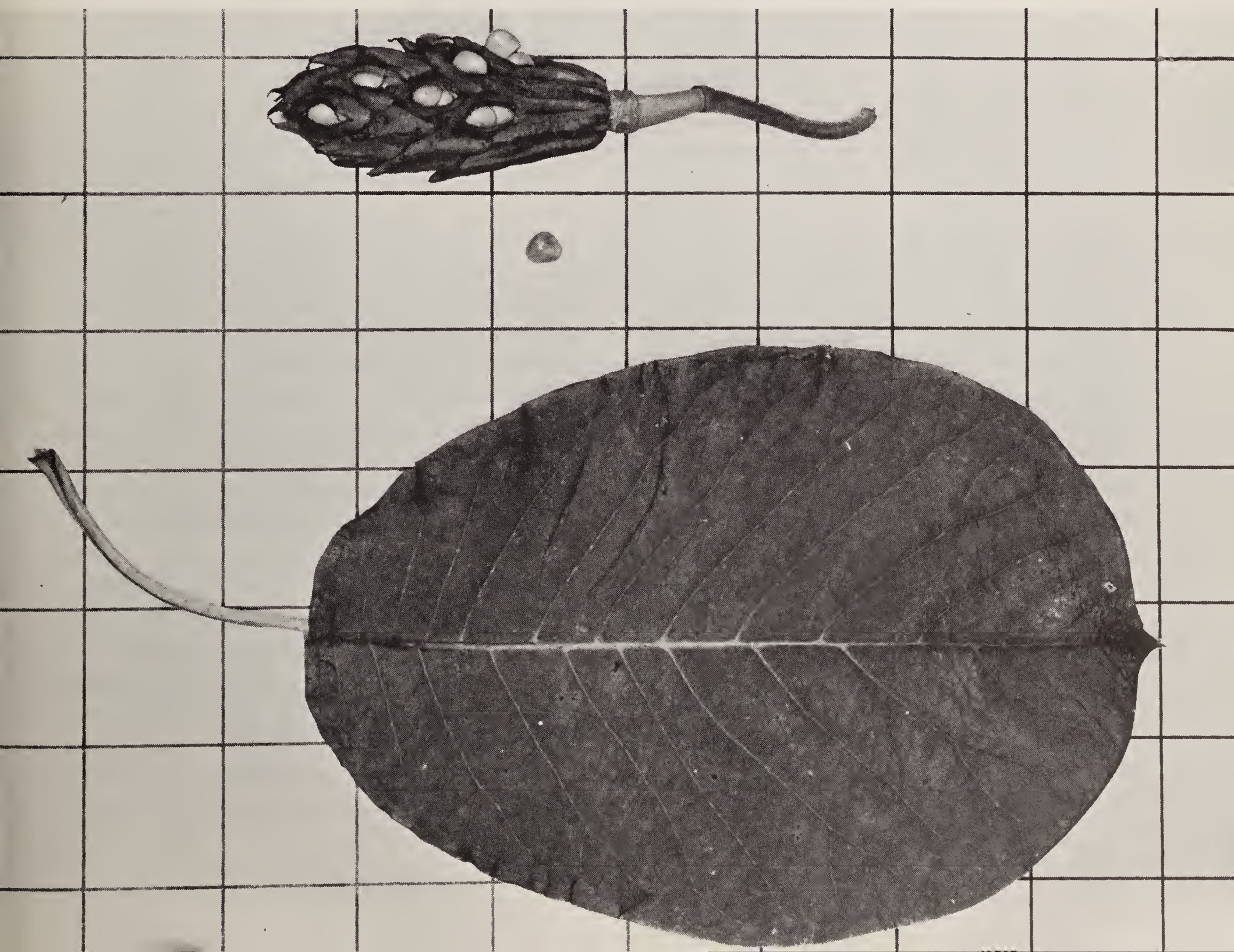
PLEASE MENTION THE

ARBORETUM BULLETIN

WHEN BUYING FROM

OUR ADVERTISERS

Fruit and leaf of *Magnolia sinensis* from bush east of Arboretum Drive North in Magnolia collection. Cone only, 2½ ins. long; with peduncle and pedicel 4½ ins.
Photo by: William Eng



Each In His Own Garden*

JULIA BELL THOMPSON

Gregor Mendel, one of the founders of the scientific study of heredity.

Johann Mendel (1822-1884) was born to a peasant family of Germans settled (by the fortune, probably, of the wars of the Austrian succession) in the little town of Heizerdorf in the midst of Austrian Silesia. As we are told in Nordenskiold's *History of Biology*, he showed unusual intelligence in early life and for that reason had the good fortune to be sent to a grammar school. Later he entered the monastery at Brno (Brunn), Moravia.

As was usual in Catholic monasteries, he took a new name and became *Gregor Mendel*. For three years, at the expense of the monastery, he was sent for further training to Vienna, some forty miles south in Austria. His interests were especially in Mathematics and Natural History, a combination not usual at that time but more usual, and especially fruitful, in these days of computers.

Returning to the monastery in 1843 aged twenty-one, he became a schoolmaster in a secondary school in Brno. In his spare time, he carried on experiments in heredity using the garden variety of edible peas, which he raised in the cloister gardens.

He had a carefully worked out plan. His first consideration seems to have been to select a type of plant that would grow easily and mature fast; which had characters that were simple and obvious. In other words Mendel had the type of mind that sees what sort of trap one has to set in order to get possession of indisputable facts — facts which rule out guessing,

*This is the third and final article in Mrs. William Thompson's series about early botanists.

and force investigation to proceed along the straight and narrow path that the facts have pointed out.

For eight years, Mendel crossed some seven varieties of the edible peas, varieties that had strongly contrasting characters such as the tall six-foot plants with those only one foot tall; plants some with smooth seeds, others with wrinkled seeds; some with red blossoms, others with white; and so on. From prolonged and careful work he, mathematician that he was, produced a formula, A+2Aa+a, now called Mendel's ratio.

It occurs to me that Mendel, having spent his youth as a peasant boy in a farming community, had heard much talk by the farmers of crossbreeding their cattle and probably their grain. Later in his student days in his classes in mathematics, he must have thought about applying some of his formulas to the problems of crossbreeding. Loren Eiseley in his book *Darwin's Century* says Mendel was to derive the laws which make modern genetics one of the most exact of the biological sciences. "He had probed into the mysteries of the cell without a microscope. He had done it by infinite patience alone — in the solitude of a monastery garden."

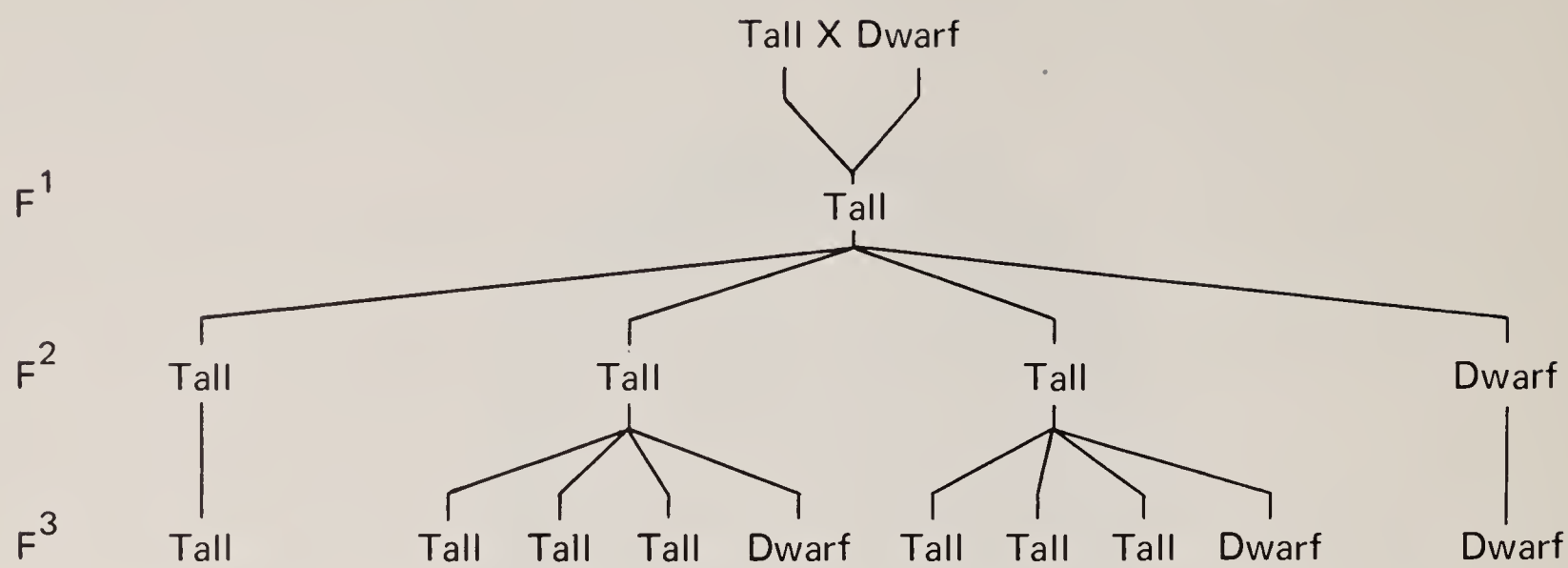
I find that I tend to disagree with the statement "He had done it by infinite patience *alone*" because I believe he had one of the most formidable tools of the biological scientist — a sharp feeling for mathematics and three years of special university training in mathematics and natural history. Besides this, he had a boyhood of practical training and interest in animal breeding. We should also remember that he had read Darwin and that one of Darwin's tools was animal breeding. Working in his cloister garden on the edible pea, Mendel obtained startling results.

A very simple, straightforward statement of the type of experiments planned carefully by Mendel to cover such questions, is given in Charles J. Chamberlain's book on *Elements of Plant Science* published in 1930 for the use of pupils of high school, or elementary college botany. Chamberlain was a professor of Botany at the University of Chicago. On page 101 of that book, he explains that the principles given by Mendel as to the laws of heredity "are so fundamental that more progress has been made in plant breeding since the year 1900 (when Mendel's work was discovered after thirty-four years) than in all previous time put together," and that the "name of Mendel with the terms Mendelism, Mendelian hybrid, Mendelian factor, and Mendelian ratio have become a necessary part of the vocabulary of every plant breeder."

Chamberlain proceeds to give an example involving Mendel's use of plants of contrasting characters by crossing a tall plant with a *short* plant of the same species. He says "the first generation resulting (F^1) all the hybrids are tall. Mendel calls these tall peas *dominant*. But when these hybrids are pollinated with their own pollen, the second (F^2) generation does not behave in the same way. One fourth of the plants are short, and these short plants when self-pollinated continue to produce only short plants. The other three-fourths of the plants are tall and look alike, but they do not behave alike, for one-third of them remain tall in generation after generation when pollinated with their own pollen; but the other two-thirds, when pollinated with their own pollen produce tall and short plants in the ratio of one short plant to three tall ones." This is the Mendelian ratio, which Mendel himself expressed as follows: A+2Aa+a. In this ratio, *A* means tall plants and *a* means short ones. It also means that one-fourth of the plants, *A*, when self-pollinated, produce only tall plants; one fourth, *a*, only short plants; and one half 2A a, continue to break up in the ratio A+2Aa+a.

A much later book, the textbook *Botany* (1967) by Wilson and Loomis, used at present by the University of Washington's Department of Botany, again shows a diagram of three generations F^1, F^2 and F^3 of two varieties of the edible pea, again of a tall, six foot plant crossed by the dwarf, a one foot plant. The authors explain that when the seeds from this cross were planted they produced "plants that were not intermediate between the two parents as might be expected, but all tall like the six foot parent." This (F^1) generation Mendel called *dominant*. As in all of his experiments, the second generation (F^2) self-pollinated as in all of the hybrids, not all were tall plants but three tall and one dwarf. In (F^3) Mendel found that the (F^2) dwarf produced only dwarfs, and

continued through other crosses to do the same. He called this a *recessive* character. The figure # 16.2 looks like this:



William Swanson said in 1834 "great revolutions in science are scarcely ever effected but after their authors have ceased to breathe."

This sage observation could well have been made for all four of our "experimenters" but surely with major meaning for Sprengel and for Mendel. Sprengel's failure to impress his contemporaries seems to have been due to ignorance on their part of the forces that were striving toward the establishment of the theory of evolution. But Gregor Mendel, (1822-1884) belongs to the 19th Century as does Charles Darwin (1809-1882). Loren Eiseley in his book *Darwin's Century* in a chapter called "The Priest Who Held the Key to Evolution", points out that Mendel was advised by Nageli, one of the great European botanists of his generation, and was betrayed by him, not consciously, we may say in charity, but betrayed by condescension. Mendel was an amateur, and the professional scientist to whom he looked up and whom he admired saw in him no more than an instrument for the furtherance of his own researches.

There is evidence that while Darwin was never privileged to know of Mendel and his theories, Mendel did "have a well stocked library with an annotated copy of Darwin. We know, too, that he had tried experiments to test the Lamarckian principle."

Eiseley quotes from Hugo Iliss, "On a clear, cold evening in February, (of 1865) Father Gregor Mendel read before the Brunn Society for the study of Natural Science, his paper upon experiments in 'Plant Hybridization'." Eiseley goes on to say that forty people were present at the schoolhouse where Mendel read his paper, that they were not ignorant people, but botanists, plus a chemist, an astronomer, and a geologist among them, and that Mendel spoke also a month later to them.

It was a patient audience, but at the end of the "blue-eyed priest's presentation of his researches, the still existing minutes of the society indicate there was no discussion." Eiseley goes on to say that the stolid listeners had risen and dispersed just as stolidly without a single question nor a "quickened heartbeat." In the little schoolroom one of the greatest scientific discoveries of the 19th century had just been enunciated by a professional teacher with an elaborate array of evidence. Not a solitary soul had understood him. Eiseley also says that four hugh volumes by the scientific historian, John Merz, recording 100 years of discovery, gave only a footnote mention to Mendel, whereas today Gregor Mendel shares with Charles Darwin and Lamarck "the biological honors of the 19th century." Mendel's results, were, however, published by the Natural Science Society at Brunn in 1866, but received little attention. "My time will come," Mendel said. He had become Abbot of the monastery in 1864, but came into serious trouble later by refusing to pay taxes the government laid on the monasteries. At first all the monasteries fought the tax, but finally all capitulated except Mendel.

If Mendel's treatises had come to Darwin's attention, they would have been of great value to him. When by a strange coincidence, they did come to light some thirty-five years after being published, three scientists, each unknown to the other, struggling to find a solution to this same genetic problem, saw the treatises at the same time and reported Mendel's findings.

Eiseley says that Darwinism emerged "strengthened, enriched and rejuvenated" by the discoveries which flowed from the work of the obscure priest. "There is perhaps no stranger story in the annals of science than the rise to international eminence of this solitary man sixteen years after his death and thirty-five years after the talk in the little hall at Brunn."

If it is true, as has been said, that the willow twig experiment made so carefully by Doctor van Helmont in the 16th century, did set into motion in the 20th century the thinking of scientists, we may well quote again from Thiselton-Dyer's conclusion that "in the thought of each age is the foundation for that which follows."

Bibliography

Chamberlain, Charles Joseph. *Elements of Plant Science.* New York: McGraw, 1930.

Eisley, Loren. *Darwin's Century.* New York: Scribners, 1958.

Huxley, Julian. *Evolution, the Modern Synthesis.* New York: Harpers, 1942.

Meeuse, B.J.D. *Pollination.* New York: Ronald, 1961.

Nelson, Peter K. "The Process of Photosynthesis." *Arboretum Bulletin.* Vol. XXXIII, W 13.

Nordenskiold, Erik. *The History of Biology.* New York: Tudor, 1936.

Rabinowitch, E.D. "Progress in Photosynthesis." *Scientific American,* 1953.

& Govindjee. *Photosynthesis.* New York: Wiley, 1969.

Sprengel, Christian Konrad. *Das Entdeckte der Natur im Bau und in der Befruchtung.* Berlin, 1793.

Steward, F.C. *About Plants.* New York: Addison Wesley, 1966.

Thomas, J. Arthur. *Heredity.* New York: Putnam, 1909.

Wilson & Loomis. *Botany.* New York: Holt Rinehart, 1967.

ARBORETUM WEATHER

January 1, 1971 — December 30, 1971

	Temperature				Precipitation		Sunshine	
	Max.	Min.	Ave.	(Normal)		(Normal)	% Sun	(Normal for last 4 years)
Jan.	56°F.	21°F.	38.8°F.	38.2°F.	5.26"	(6.55")	—	—
Feb.	56	24	40.0	42.1	4.11"	(4.20")	36	(45)
Mar.	61	18	41.7	43.8	7.25"	(3.75")	39	(47)
Apr.	78	32	48.8	48.2	2.54"	(2.63")	54	(51)
May	88	38	55.7	54.9	1.79"	(1.87")	43	(58)
June	84	41	56.8	59.9	2.24"	(1.56")	31	(55)
July	94	42	65.5	64.2	0.73"	(0.72")	62	(66)
Aug.	95	48	67.7	63.7	0.50"	(1.19")	76	(66)
Sept.	80	40	57.6	59.4	3.58"	(1.96")	62	(57)
Oct.	72	23	51.0	51.8	3.33"	(3.56")	31	(37)
Nov.	56	27	45.7	44.5	4.55"	(6.03")	20	(27)
Dec.	49	21	37.5	40.5	6.09"	(6.18")	6	(17)
Total					41.97"	(40.11")		

Notes: 1971 was not an especially good year weather-wise. For instance, 10 days in March registered a minimum of 32°F. or lower, while there were 15 days in December with a minimum of 32°F. or lower and 3 days with a maximum below freezing. August was warm with 4 days 90°F. or above and 15 days 80°F. and above. December is not normally our most sunny month, but even so we received only 6% of the total possible.

J.A. WITT

ARBORETUM CLASSES

ARBORETUM IN FALL COLOR – BIRD MIGRATIONS – BONSAI CULTURE – FALL GARDENING CHORES. These are some of the classes tentatively planned in the Arboretum Education program for Fall, 1972. Mr. Joe Witt, Mrs. Zella Schultz, Mrs. Connie Raphael, and Mr. Chico Narro are among the gifted people who will be teaching.

Watch for further information in the BULLETIN or SPECTRUM, the University's Continuing Education Class Schedule. You may call 543-2590 to have your name placed on the SPECTRUM mailing list or 543-2730 for further information about specific classes.

Remember –

That Flower Thing

in the Spring!

HONORARY MEMBERSHIP

On October 7, 1971, Emily Haig (Mrs. Neil) became the eighth person since 1906 upon whom The Mountaineers have conferred honorary membership, given only for "distinguished and outstanding service to the spirit, ideals, and purpose of The Mountaineers." She is the first woman to be so honored.

A Board member of the Arboretum Foundation and for many years Chairman of the Japanese Garden Committee, Mrs. Haig has been an active member of The Mountaineers since 1958. She has served as author, lecturer, and pioneer in the cause of conservation at Congressional and legislative hearings not only for The Mountaineers, but also in her capacity as Board Member of the North Cascades Conservation Council, Olympic Park Associates, Nature Conservancy, Washington Environmental Council and as President of the Seattle Audubon Society. Her devotion to all projects and her unceasing efforts to develop and promote that in which she believes serves as an inspiration to all who know her.

D.E.B.

This is your Arboretum, kept alive by your support

We are pleased to welcome the following new members (January 1, 1972 through March 31, 1972): *Supporting* – Mrs. Lyman W. Hull. *Sustaining* – Mrs. William E. Cox, Mr. and Mrs. Ken Rogers. *Annual* – Miss Marion B. Appleton, Mrs. Richard D. Auerbach, Mrs. Ele Baggett, William J. Bain, Jr., James Barlup, Mrs. C. F. Bauer, Yvonne Bicek, Mrs. Robert C. Bolles, Mrs. Edward S. Campbell, Mr. and Mrs. Herbert C. Clare, Mr. and Mrs. Charles Day, Mrs. Maelissa Watson Elmer, Mrs. John England, Mrs. Harlow J. Evenson, Guy L. Falskow, Mrs. A. R. Feek, Mrs. Henry Fitch, Mrs. Richard Friedman, Mr. and Mrs. Gibb Gilchrist, Trudi Gorny Godfrey, Mrs. Raymond B. Goozey, Lt. Col. Kenneth R. Gosling, Mr. and Mrs. Lawrence Gralish, Mrs. Richard L. Hedeen, Mrs. William Hynd, Miss Lo Anne Jex, Mrs. Harold Kerr, Mrs. Harvey A. Kroeller, Mrs. David Madsen, Mrs. J. B. McDiarmio, Mrs. Karen McFadden, Mrs. Thane W. Mitchell, Mrs. George S. Newcom, Miss Miriam Randall, Mrs. John Roberts, Mrs. R. V. Sanga, Virginia Senechel, Mr. and Mrs. Douglass Shands, Mrs. William L. Shannon, Mrs. L. C. Shepardson, Mrs. George B. Smith, Mrs. John G. Sweitzer, Mrs. Robert L. Terrell, Mrs. Leonard R. Thompson, Mrs. Michael Thompson, Mrs. Jack M. Tupper, Mrs. Walter Williams, Mrs. John M. Wills, Mrs. Gene Wingard, Mrs. Jan Wolak, Karin Wold, Mrs. W. Nikolaus Worden, Mrs. Kenneth Youngman, Jr.

We are also grateful to the following members who have increased their dues to: *Contributing* – Mrs. John Faris Hall, Mrs. William F. Niedringhaus. *Sustaining* – Mrs. Foster H. Chapin, Mrs. A. C. Douglass, Mrs. Phil Duryee, Mrs. B. H. Gardner, Jr., H. W. Higman, Robert Hitchman, Mrs. Charles E. Odegaard, Mrs. John Youell.

ETHEL AMANN BOGLE

For almost forty years Ethel Amann Bogle (Mrs. Lawrence) was associated with the Arboretum! With her death in January, the Arboretum Foundation has lost a devoted member whose inspiring leadership and vision helped to promote and establish an arboretum which has acquired great beauty and civic value.

The need and desire for an Arboretum had been growing for many years, but it was not until 1932-33 that funds became available and the necessity for landscape plans was recognised. Mrs. Bogle interested the Seattle Garden Club in raising the funds for such plans, and largely through her efforts Mr. J. F. Dawson of Olmstead Brothers of Brookline, Massachusetts, the nation's outstanding Landscape Architects at that time, was retained to develop them. In March, 1935, Dr. Sieg, President of the University of Washington, appointed her to the first Arboretum Advisory Council. In December, 1935, that group established the Arboretum Foundation. Mrs. Bogle was a member of that first board and served in that capacity until 1961 when she was elected to Honorary Board membership.

Her interest and leadership continued throughout the years. She was instrumental in the funding, planning and planting of Azalea Way by the Seattle Garden Club. In 1959, in appreciation of her complete and unchanging devotion to the Arboretum, the Ethel Bogle Unit was organized. She maintained close relationship with this group until her death.

A friend who worked with her on early endeavors has said, "Without her energy and her persistence there would not have been an Arboretum!" She will be remembered for her unfailing support of the Arboretum, her interest in civic affairs and in music, for her devotion to her family and her loyalty to her friends.

Glen Trimble (Mrs. Kerry)

HARRISON J. OVERTURF

The Arboretum Foundation has lost a loyal friend and supporter. The loss of Harrison J. Overturf will be felt by his many friends. Therefore it is fitting that we should recall some of the facts about a man whose unflagging interest in the arboretum continued even after his activities became curtailed. He was an architect of distinction, beginning his practice of architecture in this city in 1930. He retired in 1970. He served as the President of the American Institute of Architecture from 1958 to 1959.

Although professionally a busy man he gave of his time and talents to promote the development of the Arboretum. He was a member of the firm that designed the original Floral Hall plans for the Arboretum. A member of the Board of Directors of the Foundation from 1955 until his death a short time ago, he served as a Vice President at one time and was a member of the Japanese Garden Committee. When Mr. Juki Iida designed the Japanese Garde, it was Harrison Overturf who painstakingly translated these plans to our scale of measurements.

Many members will recall that plans for the Stimson Memorial Gates were conceived by Mr. Overturf and drawn up by him. He worked patiently with the Memorials Committee to see this project to completion. The finalized plans for the gates were not executed by Mr. Overturf but were given his full endorsement. He would have been pleased to have known that the fine bronze gates will be installed early this summer.

We owe much to this gallant gentleman. Thus on behalf of the Arboretum Foundation we acknowledge his devoted services.

Rosamond P. Engle (Mrs. Allan B.)
Chairman, Memorials Committee

UNIT CONVERSATIONS

Late additions for "That Flower Thing in the Spring" coming soon, Thursday and Friday May 4 and 5, are glamorous treasures from the tropics. Plant Sale Chairman Mrs. Arthur Gardiner returned in February from Hawaii loaded with Norfolk Island pines, crotons, palms and ferns. These exotics all passed plant quarantine inspection and will be found in the House Plant Department.

The Trees Department has new items never before available at our sales: *Acer japonicum* 'Aconitifolium', a maple with interesting leaves; *Styrax* Obassia, larger all over than *Styrax japonica*; the *Castanopsis* or chinquapin from Oregon; *Quercus* 'Sadleriana' or Sadler's oak, a grayesh plant which is not actually an oak but an evergreen shrub very useful in dry, hard-to-grow-anything areas; and *Magnolia stellata* 'Royal Star' which is heavy with buds. Each would be a beautiful addition to any carefully planned garden.

Also in the Trees and Shrubs Department, a table of special plants — bigger than bonsai, tinier than trees — will fill a need for dwarfs and will be hand-picked for interesting shapes: pendulous, gnarled, slow growing, or in unusual colors. They include *Chamaecyparis obtusa* 'Gracillis', both green and golden, *Cedrus deodora* 'Pendula', *Pinus aristata* and *Juniperus communis* 'Nana Compacta', all good for entry-way, pool or rockery planting.

Patrons may wish to have a snack while browing through the sale. Units 54 and 52 are manning the food table. In addition to something hot, ice cream, milk, and cold drinks will be added to the usual coffee and cookies.

Workers will be needed right up to sale time. We would especially welcome more men to assist with Traffic, Will Call, Pre-orders, and as shuttle bus drivers. Please call Personnel Chairman Mrs. David Veblen to volunteer — GL 4-2213.

Come, bring a friend, and have a happy day!

Wanted: A Wild Garden *(continued from page 4)*

Vancouveria planypetala
Fumariaceae — Fumitory Family
Dicentra formosa
Cruciferae — Mustard Family
Radicula nasturtium-aquaticum
Saxifragaceae — Saxifrage Family
Heuchera glabra — H.
Mitella ovalis
Telima grandiflora — to C.
Tiarella trifoliata — to C.
Tolmiea menziesii — to C.
Rosaceae — Rose Family
Osmaronia cerasiformis
Rubus lasiococcus — C. & H.
R. nivalis — C.
R. pedatus — C. & H.
Celastraceae — Staff-tree Family
Pachystima myrsinites — C. & H.
Aceraceae — Maple Family
Acer circinatum — to C.
Violaceae — Violet Family
Viola sempervirens
Araliaceae — Ginseng Family
Oplopanax horridus
Cornaceae — Dogwood Family
Cornus canadensis — C.
C. nuttallii
Ericaceae — Heath Family
Arctostaphylos uva-ursi — to H.
Chimaphila umbellata — to C.
Gaultheria hispidula — C.
G. ovatifolia — C. & H.
Gaultheriaa shallon
Kalmia polifolia
K. polifolia microphylla — H
Ledum groenlandicum — to C.
Menziesia ferrugineum — to C.
Pyrola picta — C.
Rhododendron macrophyllum
R. occidentale
Vaccinium ovatum
V. membranaceum — C.
V. parvifolium
Primulaceae — Primrose Family
Trientalis latifolia — to C.
Hydrophyllaceae — Water-leaf Family
Hydrophyllum capitatum — C.
H. tenuipes — to C.
Caprifoliaceae — Honeysuckle Family
Linnea borealis — to C.
Sambucus callicarpa — to C.

Book Reviews

HILLIER'S MANUAL OF TREES AND SHRUBS. Hillier & Sons, Winchester, England, 1971; Price £2.00 (in hard covers)

For many years the nursery firm of Hillier & Sons, of Winchester, England, has been known world-wide to arboreta, botanical gardens, nurseries and private plant collectors as one of the best sources of woody plants of all kinds, which they were fully competent and well prepared to ship to any country where they could legally be admitted.

Further, they took unusual pains to ensure that their plants were properly named, as well as briefly described in extensive and regularly issued catalogues, of which the University of Washington Arboretum possesses a considerable number.

In 1971 the firm published this *Manual*, which is an enlarged and extended catalogue of 576 pages containing descriptions of more than 8,000 kinds of plants, most of which they have available for sale or can propagate and supply within a reasonable time. The descriptions are necessarily short, but provide the essential characteristics of the plant together with the name of the author (if a wild species or variety), synonyms still in use, common names if any, the date of introduction to cultivation, country of origin, parentage if a hybrid, and awards given by the Royal Horticultural Society in England. Signs indicate those which are evergreen, those not fully hardy, and those intolerant of alkaline soil conditions. The use of bold face type for accepted names, italics for synonyms and double quotation marks for common names makes them easily distinguished.

Trees and shrubs occupy 422 pages, climbing plants the next 33, confiers 75, and bamboos 6 pages. The final 38 pages include several giving the meanings of specific names of plants, arranged by categories such as geographical, those descriptive of lives or flowers, or commemorating persons, etc.; then lists of woody plants suitable for different types of soils, for industrial areas, shady sites, for ground covers and various other purposes; of different growth forms; for fall color, foliage of various colors, for their fruiting qualities or fragrance; finally a calendar of flowering trees and shrubs for every month of the year.

Preceding the descriptive part of the work are notes on Nomenclature and Classification of plants; drawings showing different forms of leaves and their parts, and of inflorescences; a three-page glossary of the most commonly used botanical 2ords; a useful discussion of the sexual characters of certain plants; a list of the principal collectors who introduced important plants, and notes on planting and pruning.

The whole forms a most valuable encyclopedia of the woody plants cultivated in north temperate regions, especially for horticultural students, landscape architects and nurserymen, besides plant collectors and growers of all kinds.

Errors, either factual or typographical, seem remarkably few, but the statement on p. 184 that *Magnolia Kobus* 'Wada's Memory' was raised at the Arnold Arboretum from Japanese seeds should be corrected to state "The University of Washington Arboretum, Seattle, from plants received from Mr. K. Wada in 1940."

The authors and all concerned in the production of this valuable work of reference are to be warmly congratulated.

BRIAN O. MULLIGAN

FORESTS OF LILLIPUT, THE REALM OF MOSSES AND LICHENS by John H. Bland. Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1971. $7.95

Students of nature, gardeners, and others who have admired moss carpets and lichen painted cliffs and wished they knew more about them will find this book an admirable introduction to these often-ignored sections of the plant kingdom. The author, who is an associate professor of medicine at the University of Vermont College of Medicine, has succeeded well in his aim of "going beyond the mere naming of plants and to deal with mosses and lichens as objects of nature", and presents his material in an interesting and straightforward fashion. Plant structures are defined and explained to assist the amateur in identification; microscopic details are illustrated with sharp line drawings. The lichen's curious dual constitution, part fungus, part alga, is discussed. The lichens receive somewhat more attention than the mosses, perhaps because they have been more useful to man. Chapters detail their history as food and as medicine, and there is an interesting account of the orchil dye industry of past centuries. One learns of the mosses' unique contribution to knowledge of prehistory through their preservation of the "bog people" in the peat bogs of Denmark. The role of lichens and mosses in the environment, past and present, is discussed; and a chapter is devoted to their uses in gardening, both indoors and out.

The last third of the book is devoted to the identification of lichens and mosses, and since most genera are more wide spread than those of higher plants, serves as well here as in New England. Divided into their various categories, each major group or genus is described in detail, and many are illustrated with excellent black and white photographs. One wishes, of course, for more photographs; but amateurs should be able to make at least a beginning at moss and lichen identification using this book. Chapter head drawings by Stanley Wyatt are appropriately elfin.

JEAN WITT

SECRETS OF PLANT LIFE, Viking Press, 1969.

Of this book, Sire says "It is not a textbook of botany. It simply aims to show the diverse appearance of wild plants and the richness of their forms and colours." He has arranged his collection of greatly magnified color photographs in an intelligent and orderly plan to make clear the mystery of the function, reproduction and growth of Angiosperms. The sequence follows the natural season; thus Mr. Sire takes the reader from seed or bulb through the period of bloom.

There are over 400 photographs, accompanied by just enough text to explain them. The astonishing beauty of these enlargements lead to a new appreciation of the makeup of the commonest plant, and an

understanding of Nature's prodigal way of seeding, be it with dandelion or violet.

Charming additions to the text are appropriate quotations from 20th century authors.

Student and layman alike will find pleasure and instruction in the pages of this large and handsome volume. Sire's work helps the reader to a deeper appreciation and understanding of his own garden plants.

CHLOE T. SIVERTZ

And the Spring arose on the garden fair,
Like the Spirit of Love felt everywhere;
And each flower and herb on Earth's
dark breast
Rose from the dreams of its wintry rest.

from The Sensitive Plant
Percy Bysshe Shelley

Doing It Right *(continued from page 8)*

to large properties, recreational, commercial, and residential. We are told by agronomists that grass plants do more per square inch to purify air than any other type of plant.

Locations of new trees can be a decision made and carried out before construction. Trees have many functions: they give stature and scale to the landscape picture; they provide colorful flowers, foliage, fruit, bark; they help to attract birds (and bugs!). They also provide shade for shade-loving shrubs and flowers and for West-facing windows, walls, and roofs. Densely branched deciduous trees and dense-growing conifers also provide a windbreak. Thus trees can help keep buildings cooler in summer and warmer in winter. Layers or rows of trees and shrubs have been found, scientifically, to moderate sounds or noises.

The gardener could conceivably have a good part of the garden "going" before the house is built, especially if there has been a planned sequence of site development, along with a site development plan, or a priorities list, whether the owner has been doing it himself, or whether he has sought qualified, experienced help and advice. ▲

Books for the Rhododendron Gardener*

The following list of books on rhododendrons and azaleas represent a major portion of the literature written about this increasingly popular plant material. Most may be found in libraries in our area. Those titles preceded by an asterisk (*) are either out-of-print or difficult to obtain except in library collections. Attention is also called to many fine articles not listed here which have been published frequently in the *Arboretum Bulletin;* Volume XXXIV, I (Spring, 1971) is devoted almost entirely to the subject.

American Rhododendron Society. FUNDAMENTALS OF RHODODENDRON AND AZALEA CULTURE.
A twelve page bulletin; comprehensive guide to rhododendrons for the beginner.

_____. PROCEEDINGS OF THE INTERNATIONAL RHODODENDRON CONFERENCE, Portland, Oregon, May 11-14, 1961, J. Harold Clarke, Editor.
Papers given by a remarkable list of authoritative speakers from England, Holland, Germany, New Zealand, Canada and the United States.

*_____. RHODODENDRONS, 1956. Portland, Oregon.
Contains cultural information such as growing requirements, propagation, and pest control and reference material including variety ratings, list of American varieties, Code of nomenclature, A.R.S. system of awards, and A.R.S. variety and species ratings.

*_____. RHODODENDRONS FOR YOUR GARDEN. Portland, Oregon, 1961.
Informative articles, list of species rhododendrons in their series, and compact descriptions, variety ratings and list of hybrid rhododendrons and deciduous azaleas.

_____. QUARTERLY BULLETINS. Aurora, Oregon.
Articles and illustrations of current interest to novice or expert.

_____. RHODODENDRON INFORMATION. Sherwood, Oregon, 1967.
The latest ARS publication (book); important facts, figures, recommendations for beginner or expert. Special emphasis on hybrid descriptions.

*_____. THE RHODODENDRON YEARBOOK. Portland, Oregon: Binford and Mort, 1945, 1946, 1947, 1948, and 1949.
Yearly handbooks which represent the beginning compilation of rhododendron compiled by the ARS primarily for charter members of the organization, gradually for wider circle of interested persons.

*Arboretum Foundation. THE HANDBOOK OF RHODODENDRONS. Seattle, Washington, 1946. Limited first edition of 700 copies; supplemental printing. Principle articles on rhododendrons and azaleas previously printed in *Arboretum Bulletin*, supplemented with additional information by authoritative writers regarding culture, propagation, pests, and lists of species and hybrids.

Bartrum, Douglas. RHODODENDRONS AND MAGNOLIAS. Great Britain: John Gifford, Ltd., 1957. This book indicates rhododendrons can grow where other plants would never survive, gives history, cultivation, propagation, pests, diseases and data on growing rhododendrons in tubs and pots.

Berrisford, Judith M. RHODODENDRONS AND AZALEAS. London: Faber, 1964.
Something new in experimenting with growing rhododendrons and azaleas on alkaline soil as well as rocky and peaty soil; relationship of rhododendrons to azaleas and development of modern hybrids; by an expert in growing rhododendrons in North Wales, Scotland and Cornwall.

Bowers, Clement Gray. RHODODENDRONS AND AZALEAS. New York: Macmillan, 1936, 1960, 1968.
Latest edition has new color plates, new information on nutrition, physiology, propagation as well as a translation of a recent German systematic arrangement of genus, unavailable until now in English.

*_____. WINTER-HARDY AZALEAS AND RHODODENDRONS. Boston: The Massachussetts Horticultural Society, 1954.
A brief account of these plants and their culture in zero climates of the American East.

Brooklyn Botanic Garden. RHODODENDRONS AND THEIR RELATIVES. Brooklyn, N.Y. 1971.
This special edition of *Plants and Gardens*, the quarterly publication of the Brooklyn Botanic Garden, is Handbook 66 ($1.50) and contains articles of interest by outstanding contributors throughout the United States, a brief bibliography, and where-to-buy information.

Clarke, J. Harold. GETTING STARTED WITH RHODODENDRONS AND AZALEAS. Garden City, N.Y.: Doubleday, 1960.
A good beginner's book which details how to grow successfully numerous varieties, gives data about their origin, selection, culture and care, with 74 photographs.

*Cowan, J. M. THE RHODODENDRON LEAF. London: Oliver and Boyd, 1950.
A study of the epidermal appendages. Important book for the serious student of rhododendrons.

*Cox, E. H. M. and Cox, P. A. MODERN RHODODENDRONS. London: Nelson, 1957.
First comprehensive book giving considered judgement of species and hybrids worthy of general cultivation with further information on shelter, light, watering, feeding and propagation.

Fletcher, H. R. THE INTERNATIONAL RHODODENDRON REGISTER. London: the Royal Horticultural Society, 1958.
A list of rhododendrons and azaleas as registered with the RHS and ARS prior to 1958. A necessary reference book for those interested in naming new hybrids.

*Frisbie, Leonard F. RHODODENDRON. Tacoma, Wash: Pacific Rhododendron Society.
A quarterly published from 1950—1970.

*Kingdon-Ward, F. RHODODENDRONS. London: Latimer House, 1949.
A plant hunter for 35 years in Tibet, Assam and other Far Eastern countries describes rhododendrons as he saw them in the native habitat; also essential information for the amateur grower from cultivation to choosing varieties for the garden.

Krussmann, Gard. RHODODENDRONS. New York: Drake, 1970.
This book includes history, geographical distribution, hybridization and culture by the Director of the Botanical Garden in Dortmund-Brunninghausen.

Leach, David G. RHODODENDRONS OF THE WORLD: and how to grow them. New York: Scribner's, 1961.
The definitive book on rhododendrons with fine descriptive material including detail line drawings of flower trusses, leaf types, a phylogenetic chart, descriptive list of hybrids, parentage and ratings, listing all species, series and subseries and ratings, obsolete species and correct names in current usage.

Lee, Frederic P. THE AZALEA BOOK. Princeton, New Jersey: Van Nostrand, 1958.
An American Horticultural Society book presenting facts based on scientific data so far as available.

*Millais, J. G. RHODODENDRONS. London: Longmans, Green, 1917.
First series. An account of all species of the genus rhododendron (including azaleas) and the various hybrids. Limited to 550 copies.

*_____. RHODODENDRONS, and the various hybrids. London: Longmans, Green, 1924.
Second series. 17 coloured plates, 14 collotype plates and numerous illustrations from photographs included in this most excellent book. Limited to 550 copies.

Phillips, C. E. Lucas and Barber, Peter N. THE ROTHSCHILD RHODODENDRONS. New York: Dodd Mead, 1967.
A record of the gardens at Exbury, unusual color photographs which give the reader a new perspective on plants and trusses.

*RHODODENDRONS SOCIETY NOTES 1916—1931. Edinburgh: Constable, Ltd.
Notes contributed by members of the society, including well-known plant hunters, nurserymen and others.

*Rhododendron Society. THE SPECIES OF RHODODENDRON. Great Britain: Constable, Ltd., 1930 and 1947.
A very useful handbook; the species rhododendrons with excellent line drawings.

Royal Horticultural Society. THE RHODODENDRON HANDBOOK, Part 1; Rhododendron Species in General Cultivation. London: 1963; 1967.
A reference book listing species rhododendrons in the series and keys to species within the series; excellent descriptions, synonyms, lists of collectors' numbers, etc.

_____. THE RHODODENDRON HANDBOOK, Part 2, Rhododendron Hybrids. London: 1964; 1969.
Gives names and other particulars of hybrids where

the parentage is known; also Azaleas, evergreen and deciduous.

*_____. RHODODENDRON AND CAMELLIA YEARBOOK. London: 1946–1971.
(The years 1946–1958, known as the RHODODENDRON YEAR BOOK.) Yearly reports by the RHS describing shows and the newest in Britain and the United States. Articles of lasting interest; 1971 was the final publication.

Street, Frederick. HARDY RHODODENDRONS. London: Van Nostrand, 1954.
Hybrids or species, their charm, history, development; future of hardy hybrid rhododendrons; some old and new rhododendrons, their planting, care and propagation.

_____ RHODODENDRONS. London: Cassell, 1965.
A well-known English nurseryman-author presents the rhododendron story, classified lists of selected hardy "thoroughbred" hybrids and species.

Sunset Editorial Staff. RHODODENRONS AND AZALEAS. Menlo Park, Calif: Lane Books, 1969.
Information by specialists on growing, landscaping development, problems, propagation and buying of rhododendrons, and a section on container plants. Many pictures and diagrams.

*Urquhart, Beryl Leslie. THE RHODODENDRON, Vol. I and Vol II. England: Leslie Urquhart Press, 1958 and 1962. Reproductions from paintings by Carlos Riefel.
Eighteen full page reproductions in each book; short descriptive account of foremost plant collectors and their contributions also included.

Van Veen, Ted. RHODODENDRONS IN AMERICA. Portland, Oregon: Sweeney, Krist, and Dimm, 1969.
Color photographs of popular American hybrids plus a text of fine rhododendron information from the origin of the plant to descriptions of many popular hybrids and species with a great deal of "good sense" information.

Wakefield, Geoffrey R. RHODODENDRONS FOR EVERY GARDEN. London: Collingridge, 1965.
As Head Gardener at Stonehurst with experience at Exbury, the author has much to offer on rhododendrons including seeds, cuttings, grafting, layering and his experiences as exhibitor and hybridizer.

*This reading list, another in our series, has been compiled by Marilyn Kolesar (Mrs. Richard), a member of the Arboretum Foundation Book Committee, a hard-working member of the Unit Council, and an active member of the Seattle Chapter of the American Rhododendron Society.

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